

2SC4995

Silicon NPN Epitaxial

REJ03G0194-0300Z
(Previous ADE-208-013A (Z))
Rev.3.00
Apr.05.2004

Application

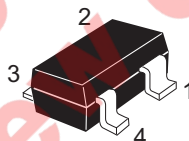
VHF / UHF wide band amplifier

Features

- High gain bandwidth product
 $f_T = 11 \text{ GHz Typ.}$
- High gain, low noise figure
 $PG = 16.5 \text{ dB Typ.}$, $NF = 1.1 \text{ dB Typ. at } f = 900 \text{ MHz}$

Outline

CMPAK-4



- 1. Collector
- 2. Emitter
- 3. Base
- 4. Emitter

Note: Marking is "YD-".

Attention: This device is very sensitive to electro static discharge.
It is recommended to adopt appropriate cautions when handling this transistor.

Absolute Maximum Ratings

(Ta = 25°C)

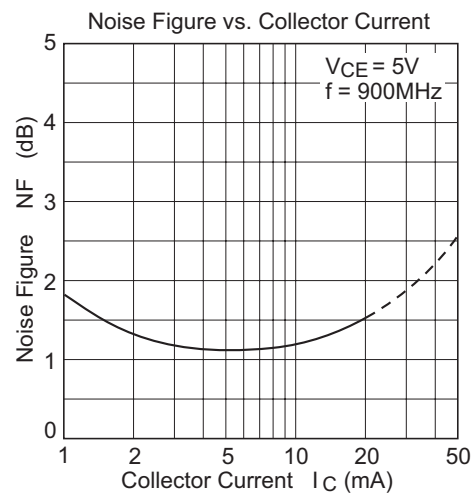
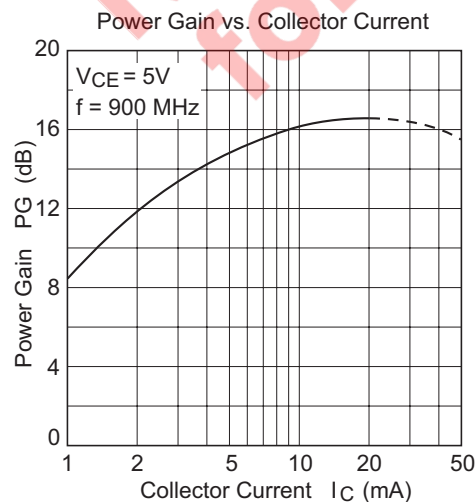
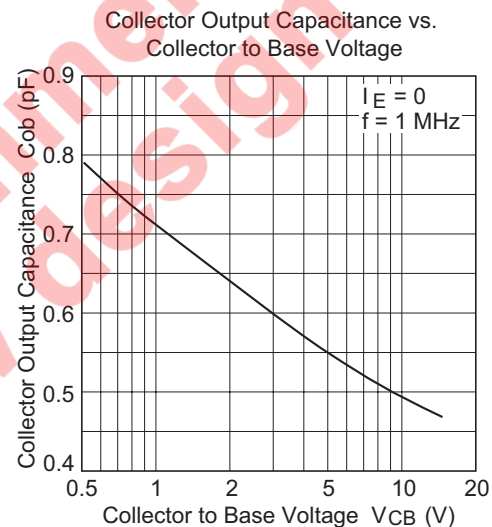
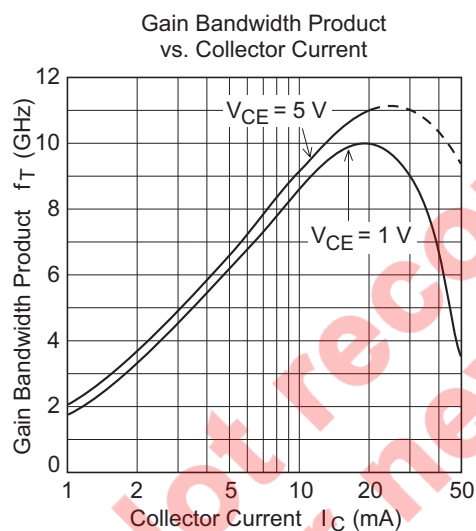
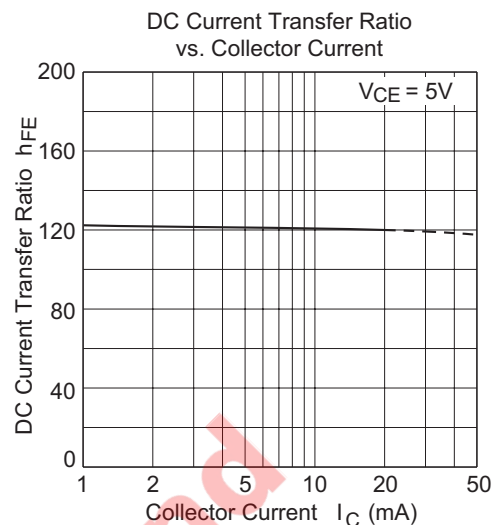
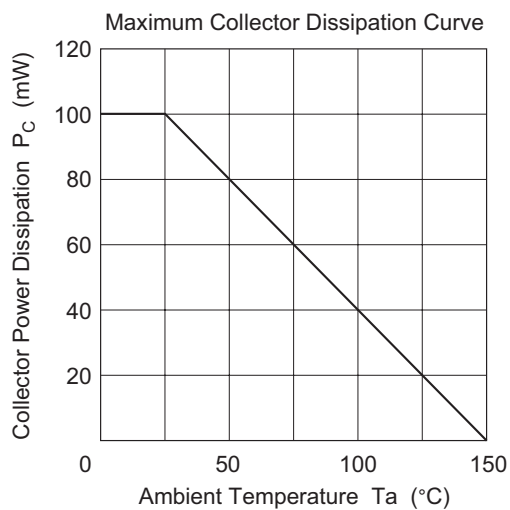
Item	Symbol	Ratings	Unit
Collector to base voltage	V_{CBO}	15	V
Collector to emitter voltage	V_{CEO}	8	V
Emitter to base voltage	V_{EBO}	1.5	V
Collector current	I_C	50	mA
Collector power dissipation	P_C	100	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

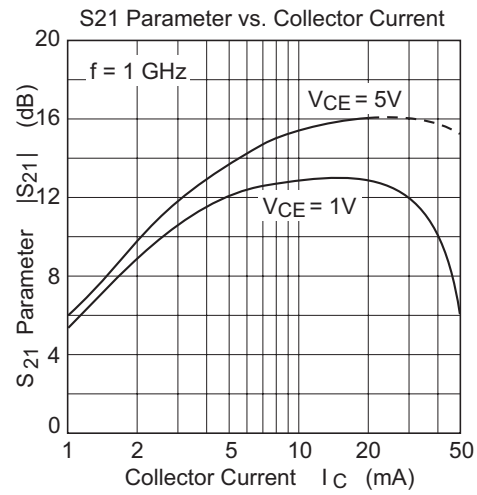
Electrical Characteristics

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	10	μA	$V_{CB} = 12 V, I_E = 0$
	I_{CEO}	—	—	1	mA	$V_{CE} = 8 V, R_{BE} = \infty$
Emitter cutoff current	I_{EBO}	—	—	10	μA	$V_{EB} = 1.5 V, I_C = 0$
DC current transfer ratio	h_{FE}	50	120	250		$V_{CE} = 5 V, I_C = 20 mA$
Collector output capacitance	C_{ob}	—	0.55	1.1	pF	$V_{CB} = 5 V, I_E = 0, f = 1 MHz$
Gain bandwidth product	f_T	8.0	11.0	—	GHz	$V_{CE} = 5 V, I_C = 20 mA$
S21 Parameter	$ S_{21} $	—	16	—	dB	$V_{CE} = 5 V, I_C = 20 mA,$ $f = 1000 MHz$
Power gain	PG	13.5	16.5	—	dB	$V_{CE} = 5 V, I_C = 20 mA,$ $f = 900 MHz$
Noise figure	NF	—	1.1	2.0	dB	$V_{CE} = 5 V, I_C = 5 mA,$ $f = 900 MHz$

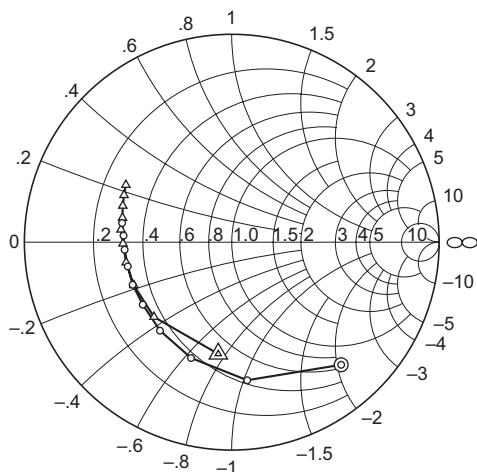
Main Characteristics





Not recommended
for new design

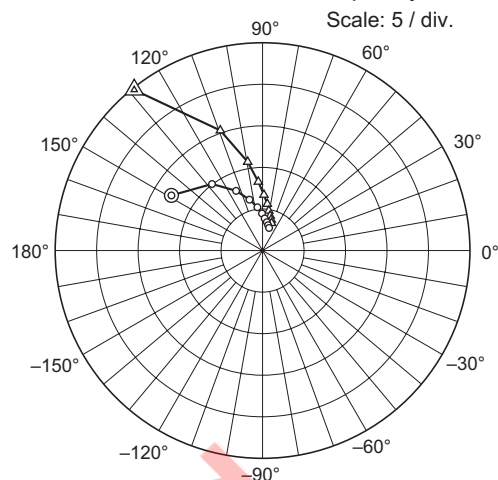
S11 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

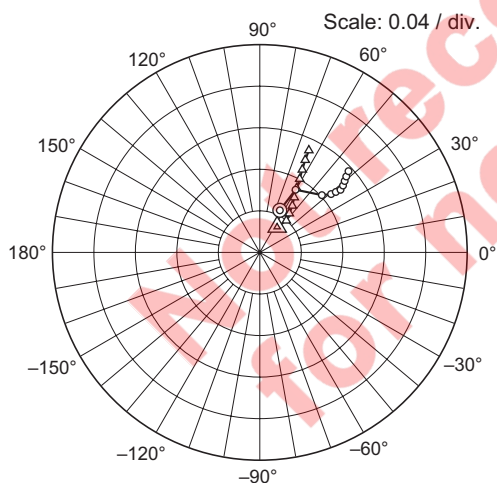
S21 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

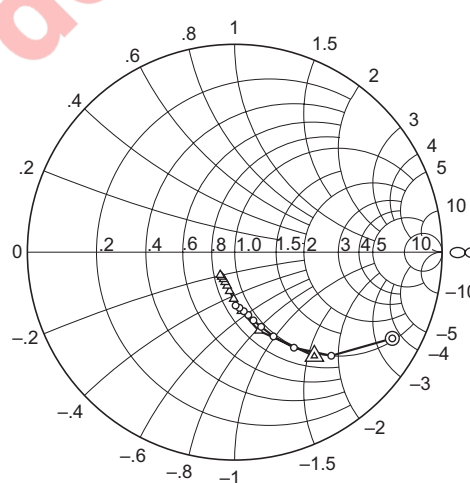
S12 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

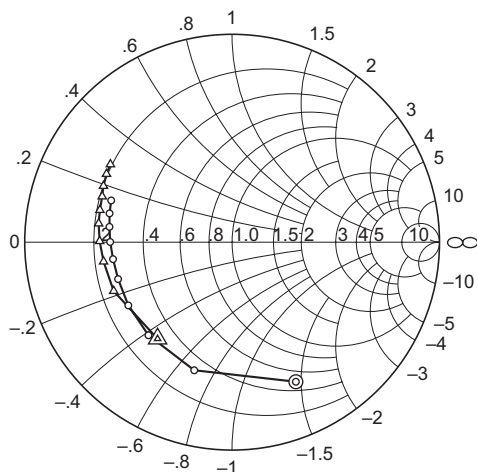
S22 Parameter vs. Frequency



Condition: $V_{CE} = 5\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

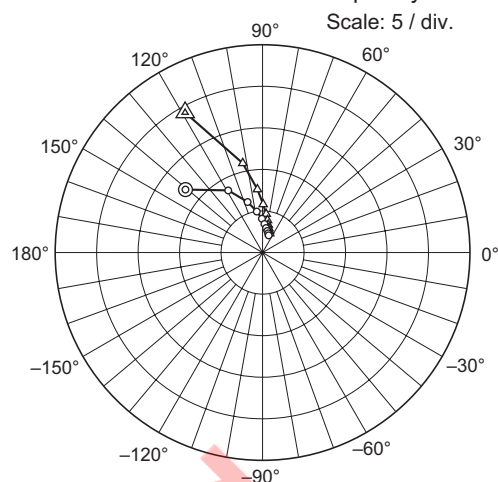
S11 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

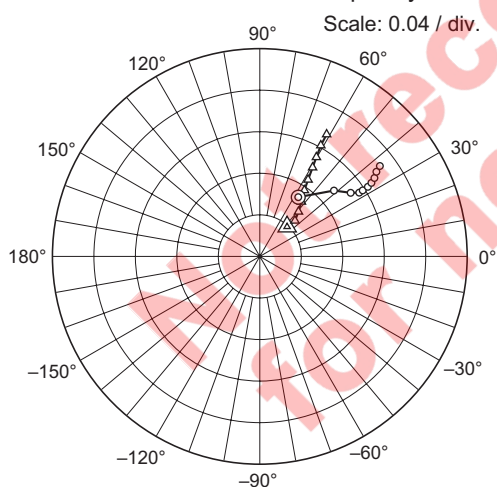
S21 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

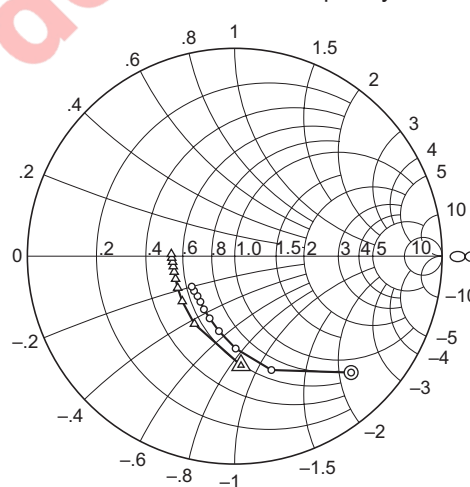
S12 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

S22 Parameter vs. Frequency



Condition: $V_{CE} = 1\text{ V}$, $Z_o = 50\ \Omega$
200 to 2000 MHz (200 MHz step)

○ — ○ ($I_C = 5\text{ mA}$)
△ — △ ($I_C = 20\text{ mA}$)

S Parameter

(V_{CE} = 5 V, I_C = 5 mA, Z_O = 50 Ω)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.781	-48.2	12.84	148.8	0.0449	64.6	0.866	-28.6
400	0.669	-83.6	10.04	127.3	0.0695	50.3	0.682	-46.9
600	0.591	-109.4	7.84	113.9	0.0815	42.6	0.541	-58.1
800	0.549	-129.1	6.30	104.4	0.0889	39.2	0.446	-65.2
1000	0.524	-145.0	5.23	96.7	0.0937	38.4	0.381	-70.4
1200	0.520	-156.8	4.45	90.7	0.0986	37.7	0.340	-74.6
1400	0.515	-166.9	3.86	86.0	0.103	38.7	0.309	-77.7
1600	0.518	-176.0	3.44	81.1	0.107	40.0	0.287	-81.2
1800	0.523	176.5	3.11	77.3	0.111	41.2	0.268	-85.1
2000	0.537	170.1	2.82	73.5	0.116	42.4	0.256	-89.0

S Parameter

(V_{CE} = 5 V, I_C = 20 mA, Z_O = 50 Ω)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.542	-69.9	24.74	128.7	0.0296	55.5	0.631	-52.5
400	0.520	-136.2	15.31	109.4	0.0398	50.2	0.395	-72.9
600	0.516	-156.3	10.81	99.5	0.0470	52.8	0.285	-83.6
800	0.519	-169.1	8.29	93.5	0.0547	55.1	0.225	-91.3
1000	0.525	-179.2	6.70	88.5	0.0624	57.9	0.189	-97.5
1200	0.538	173.6	5.63	84.1	0.0712	60.2	0.166	-102.8
1400	0.540	167.5	4.85	80.9	0.0805	61.5	0.151	-107.9
1600	0.554	161.6	4.29	77.5	0.0895	62.8	0.140	-112.6
1800	0.567	159.5	3.86	74.3	0.0991	63.8	0.134	-118.1
2000	0.580	151.7	3.48	71.6	0.109	64.3	0.129	-122.5

S Parameter

 $(V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, Z_O = 50\ \Omega)$

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.739	-65.4	11.99	140.8	0.0681	56.9	0.793	-44.9
400	0.643	-106.5	8.54	118.9	0.0957	41.5	0.576	-72.1
600	0.603	-132.0	6.34	106.4	0.107	34.9	0.446	-89.4
800	0.586	-148.7	4.99	97.9	0.114	32.6	0.369	-101.9
1000	0.578	-162.1	4.08	90.9	0.118	32.6	0.323	-112.0
1200	0.580	-171.9	3.45	86.0	0.124	32.7	0.396	-120.1
1400	0.588	179.9	2.99	81.7	0.129	33.3	0.275	-127.0
1600	0.596	172.9	2.67	77.2	0.134	34.3	0.263	-133.0
1800	0.607	166.8	2.41	73.4	0.139	35.9	0.256	-139.5
2000	0.617	161.0	2.20	70.0	0.145	36.9	0.254	-144.7

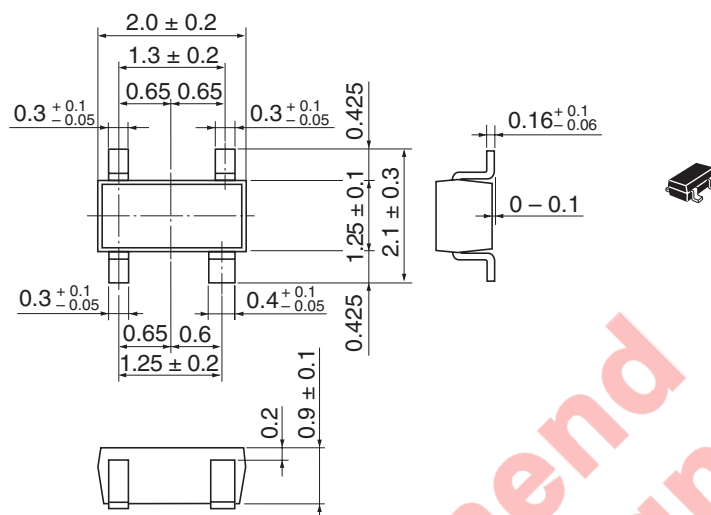
S Parameter

 $(V_{CE} = 1\text{ V}, I_C = 20\text{ mA}, Z_O = 50\ \Omega)$

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
200	0.588	-127.7	19.25	119.0	0.0389	47.2	0.527	-86.7
400	0.618	-157.6	11.00	102.5	0.0483	45.3	0.380	-120.8
600	0.627	-171.4	7.62	94.6	0.0570	49.0	0.334	-139.3
800	0.639	179.6	5.80	89.2	0.0662	52.6	0.315	-150.9
1000	0.650	172.1	4.66	84.5	0.0768	55.9	0.306	-158.9
1200	0.656	-166.4	3.94	81.1	0.0873	57.7	0.302	-165.4
1400	0.664	160.7	3.40	78.2	0.0996	59.2	0.301	-170.5
1600	0.677	156.5	3.03	75.2	0.110	60.2	0.301	-174.6
1800	0.689	151.6	2.71	71.9	0.122	61.1	0.304	-178.4
2000	0.696	147.5	2.47	69.2	0.134	61.2	0.306	178.2

Package Dimensions

As of January, 2003
Unit: mm



Package Code	CMPAK-4(T)
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.006 g

Ordering Information

Part Name	Quantity	Shipping Container
2SC4995	3000 pcs	φ178 mm Taping Reel (TL)

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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